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ABSTRACT

Federal funds support approximately 75% of the research programs conducted at institutions of higher education. When viewed from the standpoint of scientific productivity, these programs have substantially expanded the science base of the US, increased the scope of graduate and professional education, and enriched general education. But the overall impact of these programs on education has been uneven, since their effects have been predominantly on graduate education and some associated professional schools. In 1966 and thereafter, sharply imposed constraints on federal funds had a serious impact on institutions of higher education, many of which had become dependent not only upon the maintenance of a given level of federal support but upon continuing program expansion. This seems to indicate a necessity for restructuring the working relationship between the federal agencies and higher education. Universities, professional societies, and educational associations need to: (1) analyze the needs of society in order to assign the particular roles that they can play in a rapidly evolving social structure; (2) determine for themselves the most effective set of goals that would best serve the US; (3) define the general areas within these goals that are best suited for federal action; and (4) strengthen their power structures through clear-sighted analyses and planning. (WM)

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HIGHER EDUCATION & PUBLIC PURPOSES

A general sense of unease pervades our society as past "truths" are challenged and we seek to modify complex and cumbersome institutions to satisfy societal needs more effectively. This is no more clearly apparent than in fields of education. We seem to be more lacking in acceptable guides than in pressures that seek radical change. But I suspect that many of our current problems in education are troublesome transients superimposed on trends of a more fundamental nature. There are at least three of these fundamental trends. Each has an important impact. And each is interactive with the other two.

...There is the striking increase in enrollments and the broadening of the social groups directly served.

...There is emergence of research as a large and essential component of modern higher education.

...There is entrance of Federal funds, pluristic in origin, broadly supportive of essential educational purposes, but directive as to purpose.

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I

THE PAST

Looking to the past, we as citizens, have too readily accepted attractive slogans in a number of socially sensitive areas as temporizing substitutes for sets of carefully developed and well integrated Federal goals. I suppose that this has happened because we have not felt any

deep personal involvement in the goal setting process. This is understandable but nonetheless we were seriously in error when we have not protested the use of such loose statements of objectives in areas of our own professional competence as the basis for the development of concrete Federal programs. In consequence we must all bear some responsibility for the tremendous gap between aspirations and expectations on the one hand and the hard reality of performance on the other. Such a gap can be highlighted by a summary statement of some of our stated commitments.

For example:

> ...In health we are committed in an explicit fashion to provide competent health services to all, as a right and not as a privilege, and without regard to the socio-economic status of the recipient.
>
> ...In relation to our cities we have committed ourselves to a reversal of the process of decay of the inner city and to repair the results of this decay and to the tragedy it has meant to the cities, the people and industries they contain and to the Nation.

We have concurred in equally broad commitments in education without estimating the cost or defining reasonable ways of securing their satisfaction. In effect, the educational systems of the nation are committed to provide education for all, more or less in proportion to the ability of individuals to utilize it in the full development of their intellectual capability.

These are high sounding objectives, stated in all seriousness and with good intent. But being undefined, they lack credibility save that they express acceptable directions our society should take toward socially

desirable ends. Our fault has been to leave to a complex and less than critical central government the dual problems of policy formulation and program development in a number of critical and complex areas; the meanwhile pursuing our own parochial objectives within narrow program limits without regard for how these fitted into any grand design.

It is not surprising that the result of Federal intervention in the educational field has produced a great diversity of discrete Federal programs which are the responsibility of a number of individual agencies; these, in the aggregate, would not satisfy the urgent social needs even if funded in an abundant fashion. The important problems of today do not result from a simple shortage of funds, although this does cause serious discomfort. Rather they stem from the lack of a set of carefully articulated programs for Federal action derived from coherent national policies for education that take into account, the diverse and imperative needs of our society. The adequate satisfaction of these would provide a sound base for our educational systems. Unfortunately we now not only lack such broad and wise policy guides; importantly we also lack both the central Federal mechanisms for their evolution and an appropriate apparatus for their implementation.

II

THE PRESENT

It would be unfair to be critical of the interaction of Federal agencies and the many institutions of higher education and not be aware of the many real benefits that have accrued to society. Our experience in science is notable.

The science base of the Nation has been substantially expanded, and the programs upon which the expansion was based are generally characterized by excellence. This has resulted primarily from the support of research by a number of Federal agencies because of its general

relevance to the specific missions of the diverse agencies involved. I believe that these programs have been handled intelligently by the Federal agencies in part because their definition of revelance has been broad. Within such definitions Federal funds have been provided for research, education and training and have participated in the provision of research and training facilities in most of the science areas[1] that are essential to the modern university and its associated professional schools. Indeed Federal funds support approximately 75% of the research contained in institutions of higher learning. The time course of development of this support is summarized in Table 1.

TABLE I

Federal Funds for Research and Development at Universities*

Fiscal Year	Total Federal Funds** (millions of dollars)	Percent increase from previous years
1955	144	--
1956	176	22
1957	224	27
1958	288	28
1959	367	27
1960	459	25
1961	585	27
1962	755	29
1963	900	17
1964	1,077	20
1965	1,194	11
1966	1,350	17
1967	1,455	6
1968	1,481	1.7
1969 --estimated at approximately the 1968 level +-2.0 percent		

[1]The natural sciences have benefited the most from these programs but in recent years there has been developing a progressive expansion in the support of the social sciences.

The diversity of the origins of this Federal support is summarized in Table II.

TABLE II

Support of Academic Science

by Agency

Total $1.455 billion

Agency	Per Cent
Total	100
HEW	48
DOD	17
NSF	15
NASA	7
AEC	6
Other[1/]	14

1/ USDA, Commerce, HUD, Interior, Labor, State, DOT, AID and VA

When these programs are viewed wholly from the stand point of their scientific productivity they are good. They have been the basis of the evolution of a science establishment that places the U.S. in a preminent position in the world today -- by any objective measure. But their impact on education has been uneven. Their effects have been predominantly on university schools of graduate education and some of the associated professional schools such as those of Engineering, Medicine and agriculture.

But I cannot emphasize too strongly that their effects have been more than this alone and that they represent much more than a simple

utilization of university resources for Federal purposes. They have in fact

> ...Increased the scope and vigor of graduate and professional education,
>
> ...Enriched general education profoundly in many areas, and
>
> ...Provided the Nation with an adequate complement of scientists and engineers for broad and essential national purposes.

Indeed until 1966, it would be difficult to find many thoughtful scientists and engineers who would not support the need for a simple continuation of the program in being as an essential for the continued health and vigor of our institutions.

They might well agree that broader support was needed for the social sciences and for the arts and letters, but they would support the concept that such needs could be best satisfied by still other programs directly targeted at such objectives.

But there were deficiencies in the federal programs which have become increasingly clear in the subsequent years. The system of support while reasonably adequate for a period of expanding support could not adjust to sharply imposed constraints on Federal spending without serious impact on the academic institutions that contained them. There were too many financially unstable institutions that had become broadly dependent, not only on the simple maintenance of a given level of Federal support but upon the continuing program expansion. Further, the constraints affected different institutions in different ways. The nature of the curtailment was not one of a general restriction of funds to institutions. Rather it was of a nature which had devastating effects on individual institutions because of the nature of their program emphasis, and within

institutions on individual departments and individual scientists. And the institutions have had too few general resources to buffer the effects of these restrictions on Federal support. The general support programs of NIH and NSF were quite inadequate for such purposes.

The net effect of these curtailments on Federal support, as they progressed from 1966 to the present, has been to cripple some essential educational programs that were directly or indirectly dependent on these sources of funds. Particularly devasting are the effects of these curtailments on newly developing institutions that had looked to an expansion of Federal support as an essential part supported by the Federal agencies and on the young scientists who had entered these fields with the reasonable expectation that access to Federal funds was a major element in their career development.

> I should digress at this point to indicate that the Federal agencies were well aware of the problems of educational institutions produced by the sharp curtailment in the increase in the Federal funding of science, further complicated by a moderate but continuing inflation. This led to a series of surveys of the impact of the curtailment by the Office of Science and Technology. These studies conducted during the spring, summer and fall of 1968 served as a data base for an examination of Federal support programs by Ivan Bennet who was then Deputy Director of OST and a number of Federal program leaders. His views, together with some of the data, were presented to House Sub-committee on Science last August. The data used in this presentation are derived from Dr. Bennet's submissions.

Out of these experiences a number of conclusions have been drawn by many if not all elements of the Federal government as well as most elements within the educational establishment.

> ...The pluralistic support of science which has served the Nation so well since the end of World War II is not, in itself and alone, a realistic base for the long term

planning and operation of the Nation's scientific enterprises.

...Academic science and education consist of such an intimate mix of institutional functions that they should not be continued as wholly seperatable functions by the Federal establishment. And education in the sciences cannot profitably be separated from the more general educational process.

...If the advantages of pluralism in the support of academic science are to outweigh its disadvantages in both the middle and long range future then in addition general funds must be made available to institutions in substantial amounts, and for general educational purposes.

...Some high level central apparatus, non operational in character, must be developed within the Federal establishment that can monitor the needs of both education and academic science, and speak to the essentiality of these activities in the keen competition for funds in the future.

...Finally, for an effective dialogue to develop between the Federal establishment and the academic world, the latter must also find new institutional forms that can interact with Federal authorities in a more productive manner than in the past.

It is fair to say that there will not be general agreement on these conclusions, or on the relative importance of one as compared to another. Many science faculty members will still hold that a simple solution to the general problems of academic science and its intimate mix with education is the more adequate support of research. And many will oppose

the centralization of much power within the line administration of their institutions. Some will object to the centralization of power over the allocation funds in the support of science in a non-operating federal agency with a broad responsibility for the diverse fields of science and education, particularly if the educational responsibility is viewed as a general one and not limited to education immediately relevant to science. Still others will oppose any modification in the present freedom of Federal agencies to develop their own programs which would surely follow the development of a high level executive agency for policy development in science and education.

But for those who would oppose such changes, one must point out that the time for changes to take place is now. It should be possible for the Federal establishment, in association with groups such as this association and advice from the leadership of our universities, to restructure the working relationship of the Federal government and higher education.

The non-scientists in our universities should complain less about the preferred status of science in the past and appreciate that the Federal agencies already have recognized the broad university needs. Indeed in recent years, Federal support for the non science areas has increased at a more rapid rate than in the science areas. This feature of the Federal programs is summarized in Table III.

TABLE III

Relative Increases in Funds for Undergraduate and Graduate Education in the United States
1963-64 and 1967-68
(in billions)

Source	1963-64	1967-68	Percentage Change
Total	$11.2	$18.3	+63
Federal share	3.2	4.4	+37
Academic science	(2.0)	(2.3)	(+15)
Non-science	(1.2)	(2.1)	(+75)
Other	8.0	13.9	+74

Source: Office of Education

Scientists and non scientists alike should understand the striking increase in the cost of education immediately before us. The costs of higher education have increased by more than 60% over the past five years from a level of approximately $11.0 billion in 1963-1964 to a level of $18.0 billion in 1967-1968. The Federal portion of these expenditures were $3.2 and $4.4 billion amounting to approximately 25% of the total in the last year. The projections of these past experiences into the future must be accompanied by such imprecision as to be of little use although qualitative predictions can be made with assurance.

...The total cost of all education will continue to rise rapidly.

...The cost of higher education will increase proportionately more

...The Federal component of support of all elements of higher education will be substantially greater than the present 25% of the total. Some say 40% by 1980.

For those who favor change in the Federal structure and progressive change in Federal programs, then the present climate is right.

> ...The consideration of a restructuring of Federal support of science and perhaps science and education is under active consideration by the House Committee on Science and Astronautics and there is reason to believe that the Senate counterpart of this Committee is in sympathy with rational change.
>
> ...The Senate Subcommittee on Government Operations seems disenchanted with the present disarray of programs relating to health in all its elements (research, education and manpower and service). It will probably recommend changes in the operation of all functions. The impact of changes on many segments of education could be considerable.
>
> ...The Congress as a whole would appear to favor a much tighter coupling in the public understanding of the Federal support of science and education and the social purposes served.
>
> ...The allocation of resources of these fields, in a predictably tight fiscal situation, demands a more effective central spokesman, and a more effective dialogue between the official and the private sectors.

III

Some Needed Action

Importantly, desirable change will not come from central government alone. Support for rational change must be broad based in community and strongly supported by the educational community.

Heretofore, and for years, each segment of education has made its

experts freely available to the Federal agencies and these have offered what was taken to be authoritative advice on an untold number of Federal problems. But while the universities may well be the primary reservoir of the Nation's intellectual excellence, and while the professional societies and educational associations should be able to express the needs and aspirations of higher education, neither has developed keen insight into the broad forces at work in our society and the impact of these upon Federal action.

Nor have these intellectuals, their institutions and their associations, analyzed the needs of our society in a fashion that clearly assigns institutions of higher education the particular roles that they alone can play in a rapidly evolving social structure. They have not determined for themselves the most effective set of goals that would best serve the Nation. And within these goals they have not clearly defined the general areas that are best suited for Federal action within a mix of Federal state and local capability, and the mechanisms that are most suitable for such action if the essential public purposes are to be satisfied. Particularly distressing, is the void in clear sighted analyses and planning, and the weak power structure of both the institutions and the associations alike.

These comments should not be taken as a categorical damning of the advice given or the analyses and program plans that have been made. The remarks are intended to emphasize that, with much too frequency these have emphasized the needs of science and education or the needs of institutions, or the needs of students. Too little attention has been given to the needs of society and how the particular set of programs can ultimately satisfy these needs. And too frequently the advice given is blunted by the need to satisfy the conflicting interests in an institution or an association. The resulting advice then tends to

be neutral in its coloration and less than decisive in its effect.

This is to say in effect, that if our programs are deficient in their objectives, in the support required or in the support mechanisms utilized; then these deficiencies and faults are to be laid at the doors of both higher education and the Federal agencies, and not the latter alone. In point of fact, it was not until recently, and in no small measure the results of constraints on Federal spending, that all segments of the academic world and most segments of the Federal establishments are willing to agree that both parties to the evolution of the Federal programs are substantially less than perfect. In this view, the constraints themselves have served an extraordinary useful purpose if it forces all of us, Federal and non Federal alike, to view the needs of the future with a greater sense of realism; to define the purposes to be served with more precision and to aid the Federal establishment in the development of support devices that will most satisfactorily satisfy the needs. In parallel to this we must, with equal care and vigor, examine the conventions that guide the educational programs themselves. Present arrangements leave much to be desired.